VIRGINIA WILDLIFE

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Photo by Leonard Lee Rue III

"THE VOICE OF THE TURTLE . . ."

The common box turtle *(Terrapene carolina)* is abundant in Virginia. It is essentially a woodland species and craves a certain degree of moisture. This turtle is unique in that it can seal itself within its hard shell, thus affording excellent protection from all of its enemies except fire and the automobile.

VIRGINIA WILDLIFE

Published by VIRGINIA COMMISSION OF GAME AND INLAND FISHERIES, Richmond 13, Virginia

A Monthly Magazine Dedicated to the Conservation, Restoration, and Wise Use of Virginia's Wildlife and Related Natural Resources, and to the Betterment of Hunting and Fishing in Virginia

COMMONWEALTH OF VIRGINIA

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The cottontail rabbit *(Sylvilagus floridanus)* is common to the state. Young rabbits are born from March through September, with the principal breeding season in Virginia being March and April. These young rabbits and the flowering green clover are symbolic of spring.

Commission Photo by Kesteloo

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Building Citizenship

THOSE men and women who are engaged in the protection, management and development of the wildlife of fields, woods and waters have a deep concern for the future adequate wildlife populations to serve the needs of those who enjoy the great outdoors in the field of hunting and fishing.

Hunting may be done with firearms and with or without a dog, with the primitive bow and arrow, or with camera.

Fishing may be done with spinner, fly, casting rod or merely with pole and line with a minnow or angle worm dangling from a hook.

How you hunt or how you fish doesn't really matter. The method and tackle for the sport fisherman is incidental. Why you hunt or fish does matter. In the more primitive days, hunting and fishing was strictly an economic problem. It was for the purpose of satisfying the pangs of hunger that brought about the improvements in the instruments for bagging game or creeling fish.

With the improvement of lethal weapons, man began to find more and more pleasure in hunting; with the invention of the rod and reel, he began to find pleasure and happiness in fishing.

Through evolutionary processes, coupled with the development of skills and more and more leisure time, hunting and fishing have been removed from the status of occupation and labor and have moved into the realm of health and recreation activities.

More than $3 billion are now being spent annually in this country for the sport and recreation of hunting and fishing. Of this amount, $125 million are spent in the Commonwealth of Virginia.

The fundamental concept today goes far beyond the fact as to whether the hunter or fisherman is able to attain his daily bag or creel limit. Surely, no one any longer hunts and fishes because he is hungry. If he does, he is making a serious mistake. He could make enough money in one day digging ditches to buy many times more wholesome food for his table than he could obtain with gun or tackle. It is poor economy for a man to stop work for a day and take his dog and gun into the field to obtain food for his hungry family. If that is all there is to it, Virginia and all of the other states of the Union, and the federal government, too, should abandon all efforts to maintain a supply of game and fish for the teeming millions of this country.

No, there is a deeper meaning to it all than satisfying the pangs of hunger. The basic and fundamental concept of the whole program of wildlife protection, management and development is to give men, women and children an opportunity to get out into the great open spaces and touch elbows with nature. Fresh air and sunshine never did kill anybody. Rather, they constitute the alchemy which transforms weakness to strength, sickness to health and vigor, and brings pleasure and happiness to mankind everywhere.

The pages of history are replete with the stories of men who, when they want to inflict punishment upon mankind, repair to their tents or secret closets and plan death and destruction. Man does not have mean thoughts while enjoying the glorious sport of hunting or fishing in the great outdoors. His very soul becomes attuned to the things around him. Every day he spends in the fields and woods or on some meandering stream, he gains a higher appreciation of the handiwork of his Creator.

At night, he returns home and at the fireside with his little family gathered around, he recites the incidents of the day. On tomorrow he goes to his office, workshop or wherever his vocation calls him, with his feet treading firmly the earth beneath and his head in the air, convinced that his occasional contact with the great outdoors has made of him a better husband and father and a better citizen, more able to render his share of responsibility to his church, his state and to society.

Give me a boy and let me teach him how to take a gun apart and put it together again, point at the right target at the proper time; or give me a boy and let me teach him how to row a boat or cast a lure upon the bosom of some placid stream, and I will give you back a boy who, when he becomes a man, will sit on the jury and not before it.

One million men, women and children enjoy the invigorating and healthful exercise of hunting and fishing in the Old Dominion each year. I wonder what would happen if some catastrophe were to destroy all of the bird, animal and fish life of Virginia. With all the leisure time now available to the people of the Commonwealth, crime, in all probability, would suddenly rise. It behooves all of us, therefore, to lend our help to the task of protecting and developing our wildlife resources so that all people who have leisure hours to spend will occupy their time in the great outdoors in the joyous pastimes of hunting and fishing.—I. T. Q.

A model example of cooperative effort in resource development — forests, game, water, fish — at the federal, state and local level

The Virginia Plan

By J. J. SHOMON

WE stopped in a grove of hemlocks beside the spring and gazed out over the vast expanse of Lantz Mountain. Through the blue haze of the rugged Alleghenies we could make out the lookout tower on Duncan Knob. Below us, in the silent white pine timber, a woodpecker hammered out a rapid staccato on a dry snag. In the shadowy pool of nearby Laurel Fork a fish splashed after an insect.

"Did you see that trout?" I asked ranger Sedg Watson of the George Washington National Forest.

He threw me a pair of raised eyebrows. "Sorry," he said, "I wasn't looking—just listening. That woodpecker sound in the deep timber. It always gets me. Reminds me of God's country, which this really is. It's part of what makes a ranger's life worthwhile. Hear it?"

Sedg didn't have to ask. We were old friends dating way back to our days at the Ranger School in the Adirondacks, and we spoke the same language. Of course I heard the sound. Have heard it often. Heard the voice of the creek, too, and the music in the feathery hemlocks. It was the same wilderness music I associated with solitude in the eastern woodlands of Connecticut, in the Everglades, in the high-timbered country of Idaho. It was the same song, too, we experienced together on Warm Springs Mountain, on Back Creek west of the Jackson and down on the Cowpasture river. It was music being heard more often these days because of the dedicated services of men who love the wholesome outdoor environment and have been willing to devote their time and energies to the job of providing mankind with maximum benefits in water, timber, recreation — and solitude.

"Isn't it wonderful, Sedg," I said, "that someone has had the wisdom to see the potentialities of this region, to seek ways to safeguard it from further wanton exploitation. Think what this country would be like had there not been a Weeks Law and a *Virginia Plan*. We wouldn't be enjoying the country like we are today."

U. S. Forest Service Photo

The Jefferson National Forest offers 600,000 acres of hunting, fishing and other forms of outdoor recreation to the people of Virginia and the nation.

Commission Photo by Kesteloo

The Virginia Commission of Game and Inland Fisheries and the United States Forest Service work together on our national forests to assure us multiple use and maximum production of the various resources.

Watershed management and stream stocking assure the fisherman of more productive waters for his sport. Trout fishing is popular on the national forests.

Food plantings and clearings have increased upland game. Some of the finest grouse hunting in the East can be found on national forest land.

The ranger reflected for a moment and then surveyed the rugged hinterland once more. "Yes, it's quite a country. Quite a story—a saga worth repeating, worth emulating. What has happened here—and is still happening —bears retelling. If we had more examples like the *Virginia Plan,* the resource job in America would be that much easier."

What we were referring to, of course, was the unique approach that resource development was being given on Virginia's 1,500,000 acres of publicly-owned federal forest lands—a plan of cooperative resources management without peer in the United States. Labelled "classic in concept," the plan has been heralded as one of the finest expressions of teamwork between foresters, wildlifers, and other resource men found anywhere in the country.

Lyle F. Watts, former chief of the U. S. Forest Service, warmly praised the *Virginia Plan* a number of years ago, saying in his annual report:

> "The program in Virginia, in which the state sells a special stamp to all of those hunting or fishing in designated national forest wildlife management areas, continues to be a trail blazer in productive cooperative wildlife management.
>
> "In my opinion, we are entering a new era of forest-game management in the U. S. and perhaps throughout the North American continent. We know that wildlife today is a crop—like trees, corn or wheat—and can be grown."

More recently another prominent conservationist, a Virginia state official, had this to say:

> "Today the *Virginia Plan* is the most successful, most talked-about, most envied plan of forest-game management in the United States, if not all of North America, and promise to be a forerunner to similar plans throughout the continent. New hope for forest wildlife indeed!"

But to understand the *Virginia Plan* properly, one must know something of its background and the physical features of the area, its former land use, and what led to the evolvement of the cooperative resources management plan.

An Abused Mountain Region

In the uplands of Virginia, embracing the watersheds of the upper James, the Potomac, the Shenandoah and other rivers, is a million acres of woodland now administered by the federal government. This is the George Washington National Forest, the oldest and largest of the eastern national forests. Administration and protection of it were begun in 1911.

The George Washington lies in a picturesque area that is a bench mark in American history and tradition. It was frontier and passageway of pioneer and settler, travelway of roving Indians, neighbor to Jefferson's Monticello in the Blue Ridge foothills and, on less happy occasions, the skirmish area and battleground for two wars.

Immediately to the south, and virtually a physical continuation of the G. W., lies Virginia's second great national forest — the Jefferson, totaling roughly 600,000 acres. Flanking the George Washington on the northeast is rugged Shenandoah National Park with its many recreational attractions. Here the excellent and well-known Skyline Drive winds its way along the crest of the Blue Ridge Mountains and affords a pleasing array of changing vistas.

The region was settled more than two centuries ago by a few scattered frontiersmen. Heavier flows of migration from tidewater areas and from Pennsylvania began in the 1730's. Later Washington traversed it with troops and eventually included it in his "lands of the west" plans for veterans of the Braddock campaigns. Shenandoah Valley, Page Valley and the Valley of Virginia to the south, as well as the highlands surrounding these valleys, have since been heavily populated by Anglo-Saxons, Scotch-Irish, Germans, and others that make up our sturdy American stock.

The early residents were good husbandmen. They chose to live in a land that had good soil and grass and abundant timber, water and wildlife. But the timber sometimes got in the way, so it was common practice to clear cut areas for homesites, for plowland and for grazing. Fire was a powerful and positive tool for easy land clearing.

In addition to clear cutting or burning to supply new ground, there was the constant demand upon the forest for white pine, oak, chestnut, and other good lumber for housing, mills, barns and like uses. And then came the call for ties, poles, posts, fuel wood and bark for tanning for outside markets.

The human pressure—overcutting of the woods and humus-burning fires—accompanied by overshooting, had turned the forest environment against wildlife. By 1900, native game species, such as Virginia deer, beaver, raccoon, and wild turkey had become scarce. Fish disappeared from streams that began to "run dry" for a part of the year.

These water changes particularly were recognized, but they were often passed off by blaming the diminishing undersurface water supply on "different kinds of weather." Some of the more inquiring minds, however, noted the "wash" left by the runoff from bare ground as contrasted with the "seep in" where trees and other vegetation covered the hillsides and resolved to do something about it.

In 1911 Congress acted by authorizing the purchase in the East of national forest land for the purpose of protecting the headwaters of navigable streams. These lands were to be held and managed for resource conservation —use without abuse—in much the same manner as were the lands in the West that had earlier been reserved as national forests out of undistributed public domain. In line with western practice and experience, the objective in eastern acquisition was to provide primarily for watershed protection and other forms of forest conservation and to meet special eastern needs for forest restoration.

The George Washington was one of the first national forests to be established in the East. Congress passed the enabling Weeks Act on March 1, 1911. Land examinations looking toward purchase were begun in the upland Virginia areas, now the George Washington National Forest, late in the year 1911. Purchase areas were laid out and designated by such historic names as Potomac, Massanutten, Shenandoah divisions. The acquisition policy was and has remained that of purchase by a willing buyer from a willing seller.

The Jefferson National Forest was established in 1936 and contains some 600,000 acres of rugged mountain forest land, similar in character to the George Washington, which extends from the James River near Natural Bridge southwest approximately 200 miles to the borders of Tennessee and Kentucky.

Early Land Use

Virginia's two national forests, like all other national forests in the federal system, have been managed from the beginning on a "sustained yield" and "multiple use" basis. These two guiding land-use principles of the U. S. Forest Service have meant simply that the forests should be managed on a perpetual basis with "forever" in mind and that the purposes in management would be multiple in character—that is, a balance of major uses, such as watershed protection, timber, recreation, grazing and wildlife. Though water and timber were at first given

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Game Commission Photo by Kesteloo

Clearings made in dense forest growth allow sunlight to reach the ground. This increases the number of food plants available to game. Over 3,000 clearings have been made under the Virginia Plan. Money for this work is provided by the national forest stamp and money from the Pittman-Robertson fund.

HARMLESS-AND OFTEN HELPFUL

BY FRANKLIN TOBEY, JR.

SNAKES

ABOUT thirty-three of the thirty-eight species and subspecies of snakes native to the Commonwealth of Virginia are harmless. These possess no poison apparatus, or other offensive weapon harmful to man. Too often it is one of this majority group that falls under the hoe, rifle, or rake of the annoyed farmer, the preoccupied hunter or the badly startled gardener.

Many of the harmless species of snakes are easily recognizable as such if a little care and patience are taken. Snakes are great allies in the conservation battle. They feed on small rodents and insects more often than on the useful domestic or wild animals of our farms, fields, and woods. A good woodsman, if only for his own protection, knows his snakes.

Three main types of poisonous snakes occur in Virginia (figures 3-4, 5, 6). Of these three types, two have fairly distinguishable sub-varieties: copperhead (a) northern and (b) southern; rattlesnake (a) timber or banded, and (b) canebrake. Two color phases of the timber rattler—the sulfur and the black—are not counted as separate varieties since one litter may contain a few of the all-black or sulfur-colored individuals. Pure white (or albino) rattlers are extremely rare, but not unknown. The cottonmouth water moccasion is largely limited to the Dismal Swamp with occasional individuals or small colonies being reported in the Appomattox and James river basins.

It is a hard thing to convince well-meaning, but highly skeptical neighbors that the remainder of the state's thirty-three species of snakes are relatively harmless to man—bitewise or otherwise. None of them will strangle the solitary hunter or lone child even though some of these non-poisonous snakes are truly classed as constrictors or semi-constrictors. Bites from the larger, non-poisonous snakes which tear the skin should be washed and treated with an antiseptic solution.

Many of the state's non-poisonous thirty-three are look alikes. There are two green snakes and two black snakes which are separated by virtue of their polished (figure 1) or rough (figure 2) scales. Unfortunately, there is a whole horde of brown snakes which vie with one another, it would seem, for the dubious honor of being mistaken by humans for the poisonous copperhead; or worse, in the case of the many brown water snakes, being taken for the venomous cottonmouth water moccasin. Failing this, there are three varieties (including two scarlet snakes), which look like the well advertised, non-resident, coral snake. The latter does not occur in the state as a native, although local controversy rages on this point in some communities.

Perhaps in an effort to top all of the foregoing claims to ill fame, virtually all of the harmless species, when angered, will vibrate their tails in such manner as to convince the nearest human that beyond a doubt this is a "rattler" that has been suddenly confronted.

The hog-nosed snake, whose upturned snout and checkerboard back (figure 20) readily identifies him as the imposter that he is, can hardly be induced to bite. He puts on an admirable show with flaring neck and open mouth, darting and striking as long as he thinks he has a dog or a human at bay. But call his bluff, and he will roll over and play dead, even to letting his tongue loll out of his mouth to complete the comic picture. Rolled back on his belly, he will promptly roll over onto his back to prove to you that he is genuinely dead. A glance back in your wake will find him recovering suddenly to slip into the brush.

The pine snake of the Delmarva peninsula or the "bull" snake of the Appalachian highlands, which is one and the same species (figure 17), is the only other snake, besides the hog-nosed, readily recognized by its blowing and hissing noises. (The author has collected poisonous snakes and none of these ever offered any air-brake sound effects.) The pine snake has a beautifully balanced black and white pattern. The black saddles, sometimes bordered with tan, are in handsome contrast to the tile-white scales of the sides and the spaces between each blotch. Some of the white scales are edged in black. He needs only the garnishing of a few scattered green pine boughs to make him nature's camouflage masterpiece of the forest floor.

Reports are coming in from various counties throughout tidewater Virginia concerning the occurrence of the well named rainbow snake (figure 25). A truly striped snake, with lines running from head to tail (lengthwise on his body), he is unrelated to the five other species

and subspecies of "striped snakes." It is hard to tell whether this fellow is basically a blue snake with red and yellow stripes, or a red snake with yellow and blue stripes.

Rotting logs can be the hiding place of one of several small species which occupy the insect-burrows and hunt the insect pupae or grubs for their food value. They may also conceal, in large crevasses or underneath, the "highland moccasin" or copperhead, so a word of caution. Among the colorful, harmless varieties preferring the rotten log are: the ring-necked snake (figure 27), a beautiful slate-blue animal with dark head and yellow-orange ring around the neck which matches his belly; the worm snake, uniformly cocoa to purplish above, pink beneath, is one of the smooth-scaled, patternless, smaller snakes (figure 1). Either one of the glamorous scarlet snakes may be encountered in this type of digging. The scarlet king snake (figure 31) and the scarlet snake (figure 32) favor such hiding places.

Among the state's many species, the most docile in captivity and the ones most likely to succeed as pets are the king snakes. The larger members of this clan, the common king snake and the brown king snake (figures 13 and 14) will take hamburger, properly rolled to size, left in the cage overnight. These snakes are cannibalistic and smaller ones should not be left in care of the larger ones if all are to survive. A shorter one is not hesistant about engulfing one of the larger ones for supper, or vice versa.

Some research needs to be done on Virginia's red milk snakes and scarlet king snakes. Three distinct species (figures 15, 29, 31) are said to integrade, creating at least two "hybrid" types which may be found in areas shared by two of the distinct types. The yellow rat snake or striped chicken snake (figure 26) is believed to be indigenous to the state. It is a more southerly species and may be found in the counties bordering North Carolina. The coachwhip snake (not illustrated) has been reported as a possible Virginia species, but no confirmation of its occurrence has come to the writer's attention.

In the southwestern counties, around and above Bristol, a smooth brown snake of fairly small proportions, with a dark head, may be found. He is the crowned snake (not illustrated). Most specimens have a light yellow to whitish ring at the base of the head, followed by a broader black ring. The light-colored ring is closer to the eyes than is the case of the ring-necked snake (figure 27). The crowned snake alone, among Virginia snakes, is classified as "mildly" poisonous. The short, extremely small, rigid fangs are located at the rear of the upper jaw. The venom is not deadly to man but paralyzes the worms and insects which form this brown-bodied snake's food supply. Little is known about the extent of this fellow's distribution within the state, other than the general area noted above.

The state's six harmless water snakes could properly be considered fair subject matter for a separate article

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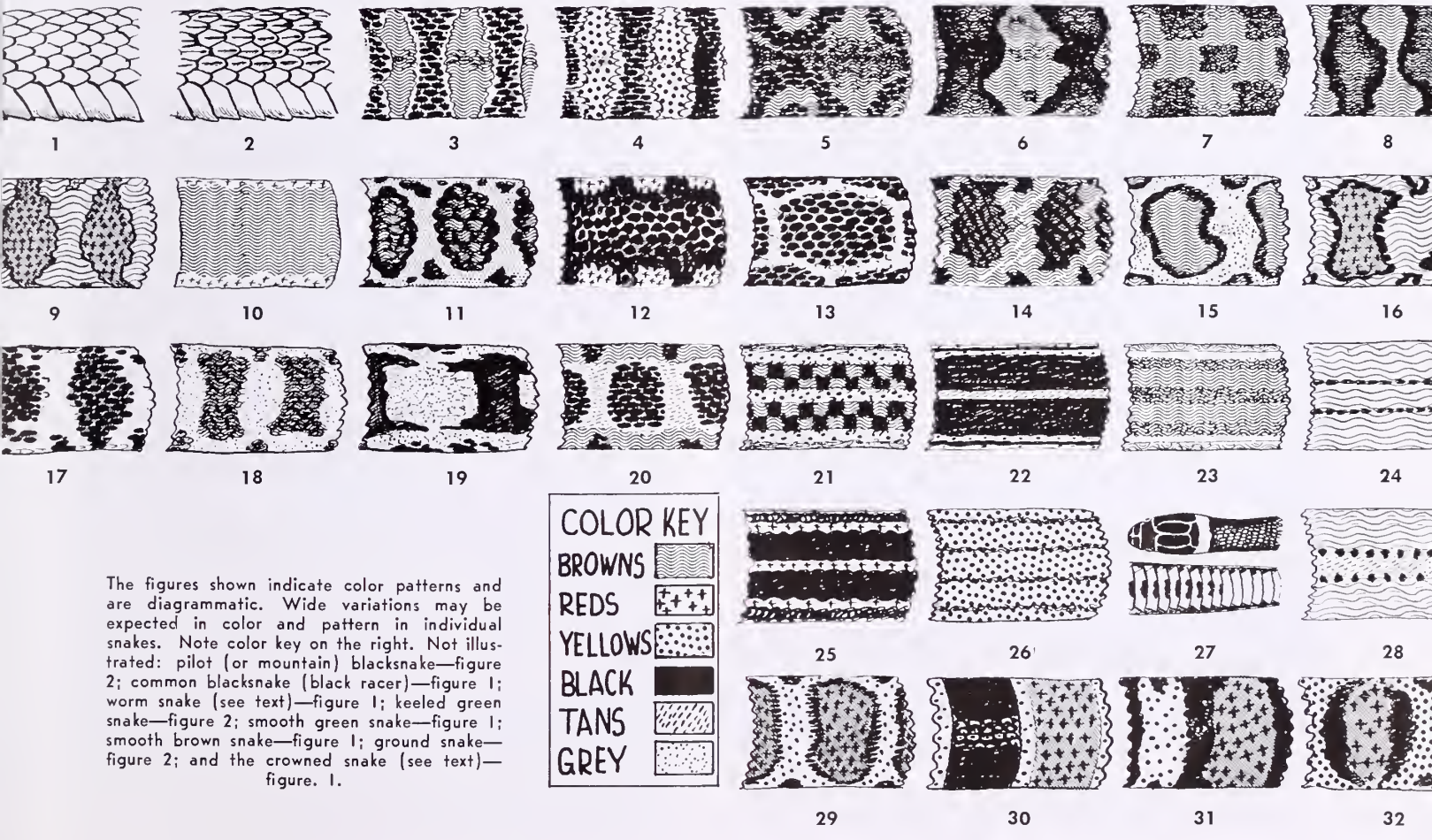

The figures shown indicate color patterns and are diagrammatic. Wide variations may be expected in color and pattern in individual snakes. Note color key on the right. Not illustrated: pilot (or mountain) blacksnake—figure 2; common blacksnake (black racer)—figure 1; worm snake (see text)—figure 1; keeled green snake—figure 2; smooth green snake—figure 1; smooth brown snake—figure 1; ground snake—figure 2; and the crowned snake (see text)—figure. 1.

What's New For The 1957 Trout Season?

By T. D. WATKINS
Commissioner, Third District

NINETEEN FIFTY-SEVEN promises to be a banner trout year in Virginia. Total trout production at the Marion hatchery and the Buller and Montebello nurseries is expected to exceed last year's figure of 447,641.

While trout will be stocked in impressive numbers, this in itself does not guarantee good trout fishing. For instance, creel census statistics collected last year indicated that 90 percent of the trout creeled for the entire year were caught during the first week and the bulk of these on opening day! Considering the heavy expense and hard work to achieve this production at the hatcheries, those results are, to say the least, disappointing—especially to the real trout fisherman who likes to enjoy his favorite sport for longer than just the hectic opening week.

In a realistic attempt to spread trout fishing over a longer period of time this year, the Commission has adopted a policy of increasing in-season stocking. This is feasible, of course, only in those streams which our technicians indicate will hold up waterwise with the onset of the hot dry summer months. Unfortunately, stream surveys begun last year indicated that few of our trout streams could be expected to hold fishable populations of big two-year-old trout later than the end of June. With this in mind, the Commission acted to open the season at noon, April 13, instead of the traditional May 1 opening date. The closing date has been extended from September 15 to December 31. This, we believe, will provide for more in-season stocking at a time when stream flows are adequate and dependable. Of course, it is apparent that if more in-season stocking is practiced there obviously can't be as many fish on hand opening day. This will certainly be a hardship on the "opening-day only" fishermen, but we doubt if our entire fish management responsibility lies in their direction. Also, while on the surface it may seem that an earlier opening date would work to the disadvantage of the fly or artificial-bait fishermen, a little careful thought will prove otherwise. Flycasting is next to impossible on fishermen-lined streams opening day. In previous years every effort was made to insure that stocking was completed by "opening

Virginia's fishermen are becoming more numerous each year. With constantly increasing fishing pressure, a program to spread trout fishing over a longer period of time each year seems feasible.

Game Commission Photos by Kesteloo

Creel census statistics collected last trout season indicate that 90 percent of the trout are caught during the first week of the season. Fishermen who avoid opening-day crowds may find trout rather scarce.

day," and by the time the number of fishermen had dropped sufficiently to enable the use of artificial lures, the bulk of the fish had been decreased also. By opening the season earlier and stocking for a longer period of time, we feel that fishing pressure and the fish harvest will be spread out to the advantage of all concerned. Of course, many problems associated with in-season stocking are expected and it will take a period of time to iron out the rough spots.

However, enthusiasm for improving our trout program can't be allowed to blind us to our fiscal responsibility. The cost of rearing and releasing two-year-old trout is high. Rearing costs over the past five years have averaged at least 40 cents apiece for two-year-old trout. Creel census studies made last year showed that about 68 percent of the trout stocked entered the creel under optimum conditions; thus the minimum cost of one trout to the creel is around 70 cents. Revenues from present license sources are not nearly sufficient to pay for an accelerated program or even to maintain the present stocking level. For example, at 70 cents per fish, it would require $5.60 to pay for one creel limit of eight fish. When deductions for law enforcement, education and administration are made, the fish division actually receives $1.50 from the sale of each state fishing license and 20 cents from the county combination hunting and fishing license. At these figures, it requires 3.7 state or 28 county licenses to produce sufficient revenue for one creel limit of eight trout!

With this picture in mind it seems logical that we must either increase our revenue or cut the expenses entailed in rearing and distributing fish if we are to continue, to say nothing of improving, the present trout program. Increasing revenues is a function of the state legislature and the Commission can do little but acquaint the public with the facts concerning the need for more money. On the other hand, positive action can and is being taken by the Commission to see that efficiency is increased in rearing and distributing trout and to lower the costs involved in the trout program. Fish biologists are constantly seeking ways to increase the take of stocked fish and extend the harvest period. Hatchery procedures are being studied to find ways of improving production and reducing expenditures. For example, feeding studies are now underway to test the efficiency of newly developed cereal foods similar to those developed for the broiler industry. While there is some question as to whether these new feeds will be as efficient and economical as our liver and frozen fish diet, it behooves us to explore any possibility of reducing expenses and increasing the efficiency of hatchery production.

The possibility of reducing expenses by rearing and releasing more one-year-old fish and holding less of these over for a full two years is also being explored. It has been found that the expense of holding trout over for an additional year adds greatly to the expense of the over-all trout program. Not only are food costs higher during the second year, but labor costs and the constant threat of loss through disease add considerably to the over-all expenses. While many fishermen would like the Commission to continue the policy of stocking only two-year-old trout, present fiscal responsibilities indicate that this policy cannot be continued indefinitely unless provision is made to increase revenues.

In considering the foregoing, the Commission has instructed the fish division to stock approximately one yearling trout for every ten two-year-olds this season. If hatchery procedures can be modified sufficiently, it should be possible to rear the yearling trout to at least ten inches by April. Actually, by this time of year, the term yearling is a misnomer; the fish are about 18

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It costs a minimum of 40 cents to raise a two-year-old trout. Once this fish reaches the creel, the price has increased to 70 cents.

Research on our trout indicates that many of our streams cannot hold two-year-old fish later than the end of June. This is one reason for setting the opening date up to April 13 this year.

Dementi Studio Photo

Maymont Park, one of Richmond's most beautiful assets, will be the site of the Thalhimer-Virginia Wildlife Exhibit. Native wild animals in their natural habitats will be a center of attraction to the people of Virginia.

Something New in Wildlife Education--

Native Wild Animal Habitat Groups at Maymont

By PAT PERKINSON

Richmond Department of Recreation and Parks

AS PLENTIFUL as Virginia wildlife is, the closest some Virginia children have come to seeing a groundhog or raccoon is via television. But this unfortunate situation should be remedied within the coming year as the long-awaited Thalhimer-Virginia Wildlife Exhibit begins to take shape in Richmond's beautiful Maymont Park.

In surroundings as natural as man can devise will be displayed such natives as the black bear, beaver, mink, otter, weasel, elk and deer. Ducks, sandpipers, terns and gulls will be at home in pools resembling their native haunts. Huge enclosures will house owls, cardinals, grouse, turkeys and other Virginia birds. Eventually the exhibit will include a children's farm, a reptile house and an aquarium.

The story of the Thalhimer-Virginia Wildlife Exhibit is a story of perseverance on the part of a small group of interested citizens who have been striving toward their ambitious goal for more than a decade. The project received its impetus from two very successful sportsmen's shows held in the parking lot of Thalhimer's Inc. in 1944 and 1945. Thousands of men, women and children thronged to the downtown lot to see the wildlife exhibits. So impressed by this interest were officials of the store that they determined to make a permanent wildlife display possible. In 1945 they donated $10,000 to the city for such an undertaking. Efforts to establish the exhibit have been coordinated by the Richmond Department of Recreation and Parks.

A committee appointed to study the situation in 1947 agreed from the start that the exhibit should not be in the nature of a zoo, nor should it be a museum of stuffed

animals, but that it should be a display of native animals in their natural habitat. They considered it essential that a competent naturalist be employed to oversee the project and carry on an educational program. Funds for the establishment of the project, they felt, should not be from tax money although maintenance of the project, once it was established, should be provided by the city.

As they embarked upon the new project, the committee defined its objectives. "The out-of-doors is a nature museum—rich in exhibits of flora and fauna. It is the objective of the Virginia Wildlife Project to lead all citizens of the community to new adventure in the appreciation and enjoyment of our native wildlife heritage through interpretative programs and services."

There followed a diligent search for a suitable setting for the wildlife exhibit. Because of the regional and statewide significance of the project and because of the natural advantages of the area, Pocahontas State Park was seriously considered as the location. This idea was abandoned, however, because the city of Richmond could not undertake to maintain the exhibit if it were placed outside the city.

Forest Hill Park, with its rolling terrain, lovely lake and many other outstanding natural features, was next choice for the wildlife exhibit. Considerable opposition was voiced by residents of the area, and so this location also was struck from the list of possibilities.

Maymont Park was then studied, and it will be here that the exhibit soon will materialize. The gift to the people of Richmond from Major and Mrs. James H. Dooley, Maymont has been a mecca for city dwellers for many years. Thousands each spring and summer tour the Italian and Japanese gardens and study the flora throughout the park which the Dooleys collected from all over the world.

In recent years the city has converted the old stone stable on the estate into a nature center. Here garden clubs and other groups assemble for meetings and exhibits and to use the library facilities. No doubt the Maymont Nature Center will be pressed into even greater service when the Thalhimer-Virginia Wildlife Exhibit becomes an attraction.

All these assets, plus the fact that the park is so large that the wildlife exhibit may be placed at some distance from residential areas, have made the final choice of the committee perhaps the most ideal after all.

Having settled on a definite location for the exhibit, the committee headed by Dr. Robert F. Smart, dean of the University of Richmond and for many years associated with the biology department, was anxious to make some headway with the project. They were slowed down, temporarily at least, by the change in city government to the council-manager form. They marked time until 1956, when the City Council included in the budget an appropriation for the project.

Good engineering guidance was needed now that the preliminary studies had been completed, so the committee elected A. W. Davenport, of Stone and Webster Engineering Corporation, to head up the project. Other officers named were Mrs. Enders Dickinson, III, and Charles G. Thalhimer, vice-presidents; Miss Claire McCarthy, secretary; and Hilton J. Herrmann, treasurer. Irving May, I. T. Quinn, Jesse A. Reynolds and Dr. Smart were appointed to serve on the executive committee. T. Preston Turner and W. C. Kellner were named to head the promotional and publication committees.

Through the efforts of the finance committee, headed by Mrs. Dickinson, $15,000 has been added to the original $10,000 available to set up the exhibit. Thalhimers has contributed the largest amount of this and Reynolds Metals and A. H. Robins Company have each donated $5,000. Other concerns have indicated a desire to contribute to the project.

Ready to move into the new habitats when they are ready are a whole galaxy of Virginia animals, including

(Continued on page 21)

Department of Parks and Recreation Photo

Going over the plans at Maymont are (left to right): J. A. Reynolds, director of the Richmond Department of Recreation and Parks, John E. Wallace of St. Louis, a pioneer of the new naturalistic concept on wildlife habitat design, and A. W. Davenport, chairman of the exhibit.

Colonial Studios Photo

An old stable, on the original Dooley estate, has been converted into a nature center. Garden clubs, girl scouts and other groups make considerable use of this building.

VIRGINIA'S

Native Wildli

Featured a

Game Commission Photos by Kesteloo (unless noted)

Two of "The Three Bears" to be featured in the collection of the state's native animals. They will inhabit a natural area in the vicinity of an abandoned quarry near the James River, in the southern sector of the Park.

One of the walkways with a natural setting in the vi
Mature trees, shrubs and other native plants alread

This area, when completed, will be a mecca for the youth of the state, as well as the adults. School groups, boy and girl scouts, FFA chapters, 4-H clubs, and other organizations will find an outdoor laboratory in which to study the native flora and fauna of Virginia.

New York Zoological Society Photo

The playful otter are sure to attract plenty of attention as they frolic about their area.

to be

Maymont Park

Department of Parks and Recreation Photo

of the wildlife exhibit location, in beautiful Maymont Park.
he area will add to the attractiveness of the project.

One of the largest habitat groups will include the deer. Since the time of Jamestown, deer have played an important role in state history.

Virginia's foxes, both red and gray, will have a home under as natural conditions as man can provide.

Plans call for including a variety of our native birds at Maymont. Large enclosures, unlike stuffy cages, will house these feathered animals.

What's the Future of Hunting and Fishing?

By I. T. QUINN
Executive Director

IN RECENT years, and especially in recent months, I've noted increasing concern among outdoorsmen over the future of our hunting and fishing. "Just what is the future going to mean to those of us who love the gun, the rod," they ask, ". . . to those of us who cherish the heritage of the greatest of outdoor sports—hunting and fishing?"

Commission Photo by Kesteloo

It is a fair question. Of course they're concerned. Why shouldn't they be? After all, is not much that is dear to our hearts in America today at the crossroads of destiny? Why should hunting and fishing be any different? In this atomic age of rapid technological progress, of piling population pressures, of change after change in our living habits—and goals—why should our conception of future outdoor recreation remain static? Why should we be molded into a new way of life, accepting modernity in all its many phases, enjoying all that brain science has given us, and still retain our old conceptions of privilege and right and freedom?

No, the world just does not operate that way. We can't have our cake and eat it, too. We cannot have the automobile without death on the highway. We cannot have modern noisemakers all about the house without some price in tranquillity. We cannot have 218,000,000 people in America fifteen or twenty years hence without food and habitation problems that go with it. We can't have millions of people milling around in the woods without some price in solitude, freedom, and privilege.

Hunting and fishing? Let's be honest with ourselves. Do we need a crystal ball to see that future hunting and fishing in America must change with the times? Do we need a game administrator, like myself, backed by thirty-three years in the business, to tell us that we must prepare ourselves for the shocking fact that the sports of field and stream are at the crossroads? Of course not. The facts are self evident. All we need to do is think about it a little and study the facts, and we can see the answer ourselves.

Now before we go on further, let me state at the outset that I am neither a confirmed pessimist nor a groundless optimist. I believe neither in the prophets of gloom that predict cataclysmic demise for the human race, nor in the happy utopian star-gazers who can see our world only through rose-colored glasses. Like the majority of administrators over the country, I can safely say I'm a realist, and as such, I can't help but view the situation as it really is. It is all very well to think of space travel to the moon or even circumpolar flights to a new kind of destiny, but we can't overlook the fact that we've got more important problems right on our back forty, in our own backyard.

Right now we have two major problems in America. They're down to earth, basic. One is the issue of freedom and the other is the issue of conservation. We can't have one without the other. On the freedom score, all we can say here is that we should be prepared to fight for freedom wherever and whenever the danger arises. Freedom must be re-won by each generation. When it ceases to be a source of struggle, it will be meaningless. Likewise conservation. If conservation were not an issue in America—an issue worth fighting for—it, too, would be meaningless. Freedom without a strong resource foundation soon dissipates itself. Similarly, conservation without the atmosphere of freedom can never hope to achieve success.

Hunting and fishing are tied to freedom and conserva-

tion. Perhaps you've never had it put to you in quite this manner before, but think about it. Is not the future of our hunting and fishing tied in directly to what we make of our freedom in the future, and how we shall accept conservation as a future way of life?

So I say that the future of hunting and fishing in America *is just what we choose to make it. It's that simple.* If we can fly to the moon, surely we can provide such more earthy things as adequate recreation for our citizenry. If we can someday hope to feed the world populace from the oceans, surely we can provide optimum productivity of our lands and inland waters for deer and quail and bass. Surely as science expands and knowledge trebles we should be able to achieve the wants most pressing to our hearts. The big question is: *how badly do we want them?*

Of course we can't have everything. Common sense tells us we can't have our resources and use them up. If we want the maximum in soil and water, in plant and animal life, we can have it—but only at a price. If we want hunting and fishing in the future, as we know it today, we can have it. It may be a little diluted in form all right, because population pressures will make it so; but we can have it. But the big question again is: *are we going to be willing to pay the price?*

If my understanding of the average American is correct, we might be willing to pay more up to a point. And there's the rub. Will the average citizen be willing to go beyond that point? This I can't answer. It will have to be left to the next generation to decide. All I can safely say is that, for the immediate present, public hunting and fishing need not be on their way out in America if we are willing to change with the times and pay for the privilege of hunting and fishing the same way that we're paying for other things.

In hunting there is still much that can be done to insure continuance of the sport, but the limitations are

Besides the potential present in huge reservoirs all over the land, fishing can and is being increased by the construction of farm ponds. Virginia, for example, has had 12,000 farm ponds added to the landscape in the last decade alone.

Game biologists, through banding return studies, have proved that artificial restocking has been a flop in most instances. The biological laws of nature cannot be changed; there is a limit to which any game species can be increased.

clearly discernible. In fishing, however, the future seems brighter. Let's analyze the two a little more closely.

Hunting

There seems no doubt to most wildlife conservationists that hunting today is at the crossroads of destiny. To be sure, we are seeing some marked increases in a few species of game, notably deer and antelope, even in grouse and wild turkey in some areas. But the cold facts are that there is *a limit* to which any game species can be increased, and when these limits are reached, there can be no more. The biological laws of nature cannot be changed. This means that so long as man himself puts no damper on his own numbers, the available game supply per capita will have to become less and less.

Now what about species that are not increasing at present but are just barely holding their own or decreasing? Obviously, here the problem will get more and more critical and complex, like the status of waterfowl, for instance. Can we hope to have more ducks and geese and still exert greater and ever greater pressures upon them, not to mention the deplorable removing of the necessary habitat? Of course not. Can we hope to have more quail and still put more land in grazing, in clean farming, in home building, in roads, in commercial developments? Surely not. We've tried artificial restocking and that has been a flop in most instances. We can't do it that way. We can only let nature do it, but we must work with her by providing the homelife that is necessary for the species. Are we willing to pay that price? Are we willing to pay the price of necessary habitat for game in the face of growing human population pressures? Your answer is as good as mine.

This does not mean that we should be discouraged in our wildlife conservation work. For some years to come we still should be able to enjoy a measure of good hunting. Private-land hunting, of course, is bound to get more

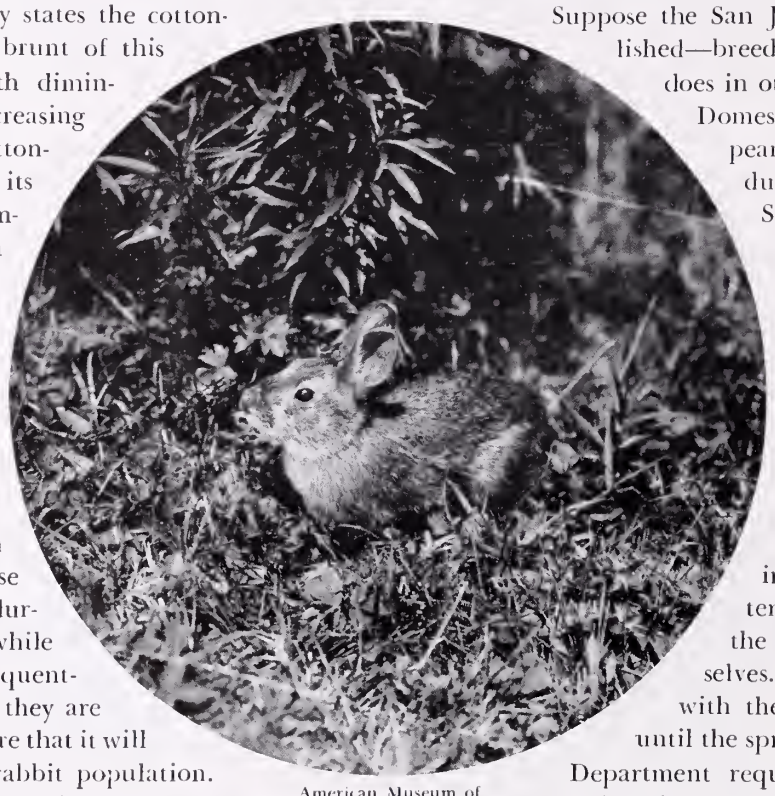
(Continued on page 23)

Some exotic species have been successfully introduced in the past, but most wildlife biologists are extremely cautious about introducing any animal not already native to an area . . .

What About The San Juan Rabbit?

By JOHN B. REDD, JR.
District Game Biologist

STATE game departments are currently faced with the problem of an annual increase in the number of hunters in their respective states and, at the same time, of supplying adequate game to meet this increased hunting pressure. In many states the cottontail rabbit has taken the brunt of this hunting pressure, but with diminishing habitat and increasing numbers of hunters the cottontail is not always holding its own. Some states have imported cottontails from other areas in the hope they would provide a larger breeding population during the breeding season, thus increasing the number of rabbits that reach the hunter's bag during the subsequent hunting season. This plan has generally failed because rabbits become weakened during long confinements while being shipped, or, more frequently, the habitat into which they are introduced is of such a nature that it will not support an increased rabbit population.



American Museum of Natural History Photo

To supplement this diminishing supply of rabbits many states have received requests from their sportsmen to import "San Juan" rabbits for stocking hunting grounds and field trial areas. The "San Juan" is actually a descendant of the European-type rabbit which was released many years ago on the San Juan island off the coast of Washington state. These exotic rabbits increased prodigiously and are now trapped and sold as San Juan rabbits. They are related to the rabbits that have eaten the heart out of Europe and have also devastated Australia and New Zealand despite enormous sums of money and effort spent in attempts to control them.

Some biologists are concerned about the fate of our native cottontail, should the European rabbit take hold. They fear this rabbit may merely fill the niche previously held by the native cottontail. The European is a larger and more destructive animal than the cottontail, and it is a great burrower. These burrows are a constant menace and nuisance to the farmer and make both hunting and control of this species different from what we are accustomed in dealing with our native cottontail.

Suppose the San Juan rabbit becomes established—breeding and reproducing as it does in other countries. *What then?* Domestic varieties of the European rabbit have been introduced on several islands of the San Juan group, which form San Juan county of the state of Washington. Around 1900, a lighthouse keeper, looking for an idea to supplement his income, bought a few so-called Belgian hares and later introduced Black Flemish and New Zealand breeds to prevent inbreeding. A later keeper, not interested in the venture, left the rabbits to shift for themselves. The food supply kept up with the high population increase until the spring of 1924, when the Navy Department requested assistance from the U. S. Biological Survey in meeting the problem of the rabbits undermining the buildings. By this time, burrowing had wreaked vengeance on the island. The ground was upheaved, with openings every few feet. Erosion occurred more rapidly, causing the bluffs to cave into the sea and, as a result, the island gradually decreased in size. Practically all the succulent forage was clipped off close to the ground. Measures were taken to eradicate the rabbits, but the best efforts could only greatly reduce their numbers. The rabbits that are being offered to sportsmen today for restocking purposes are descendants of those animals that remained after the control measures were tried in 1924.

Historians date Australia's rabbit curse from the year 1859 when 24 rabbits arrived on Christmas day, consigned to Thomas Austin. There were attempts to introduce the rabbit in Australia prior to this date, but

liberations had been made in areas where rapid population increases were limited by natural barriers. At first the rabbits were protected by law and anyone killing them was fined. Since the rabbit has no natural enemies in Australia, however, San Juans soon increased to such an extent that a bounty was placed on them. Six years after liberation, Thomas Austin had killed 20,000 rabbits and estimated that 10,000 remained on the area where they were released. By 1935 they had spread over two-thirds of the Australian continent. The rabbit adapted itself to almost all kinds of climate, from lands of a semi-desert character with rainfall of seven inches or less, to those of a moist nature with rainfall as high as 75 inches.

When the rabbit invades a section of the country, it immediately sets to work upon the vegetation. If the food is generally sparse, it eats almost anything. If plentiful and of good variety, it selects the "best" plants. The female rabbit has an almost uncanny knowledge of plants richest in vitamins which promote not only her own health but help in producing large litters of young. In grasslands inhabited by rabbits, only the poorer species of grass and herbage are left for the stock. When a dry season comes, the countryside takes on the appearance of an advanced drought, and the pastures cannot support one sheep where normally four could feed. This devastating aspect of the European-type rabbit cannot be over emphasized.

Rabbits in Australia may reside in single burrows or in most extensive warrens, comprising many burrows connected with one another. Depth of these burrows depends a great deal on local conditions and may vary from two feet to as much as eight feet. The number depends largely on the nature of the soil.

Breeding females usually excavate their burrows in the highest part of the warren, near the surface of the ground. Both the number of young in a litter and the

Game Commission Photo by Kesteloo

Many game biologists are concerned about the stocking of exotic rabbits. Should these animals become established, our native cottontails would certainly suffer.

Rabbits kill trees by ring barking, damaging leading shoots and preventing natural regeneration. The San Juan could be very destructive if it existed in great numbers.

frequency of litters are dependent to a large extent on the season and the amount of food. Six litters a year is a fairly high average for one female in a good season. The number of young may vary from two to eleven, but the average is five or six. The period of gestation is 28 days. The young, at birth, are blind and without hair. They begin to leave the nest and feed outside at about twelve to fourteen days and after three weeks can look after themselves. The young doe begins to breed at approximately four months of age.

Over the years various methods of control have been tried in Australia without much success. In an effort to exterminate the rabbit and restore the land to livestock grazing, Australians started out with high hopes of isolating the animals in infected areas. Work was begun on a great barrier fence, but large numbers of rabbits made an end-around play before the fence was finished and began flourishing on both sides. Individual farmers and ranchers put up many additional thousands of miles of netting. These fences were more successful and are considered indispensable to any effort to hold down the population.

Trapping has been tried as a measure in controlling the spread of the rabbit. This method was employed by men trapping the rabbits for their meat and hides. Most of the meat obtained was exported to England, and a large number of the hides were shipped to America, where the hair was used in the manufacture of felt hats. The total annual rabbit trade of 15 million pounds (in English money) is small when compared with the damage rabbits do to the country's economy. There are several reasons why trapping has failed, but the main one was that the trappers were reluctant to harvest the population sufficiently to eradicate them because their income and profit depended upon a large supply of rabbits during the trapping season.

Poisoning was tried and is still being used to check rabbit numbers in some areas. This method is ineffec-

tive in eradicating rabbits over large areas and is also dangerous to wildlife and stock. Sometimes large numbers are destroyed, but the individuals that remain after such an operation soon build up to pest proportions.

Digging out burrows and warrens has been tried but is very costly and time consuming. At first, this operation consisted of digging out the rabbits with picks and shovels, and then the animals were destroyed by dogs or were shot. Now the digging is done with bulldozers.

Several species of animals have been used to eradicate the rabbit with little success. Ferrets, weasels and wild domestic cats have been tried and while they destroy some rabbits, they also destroy a large number of useful birds. The European fox has been introduced and there is evidence that it destroys large numbers of rabbits, but not in sufficient numbers to control the rabbit population. The fox also destroys and has been responsible for the diminution of many native ground birds. Thus, the effects of these introduced predators on the rabbits in Australia have been negligible.

In 1949 extensive ecological studies were initiated to obtain a better understanding of the life history of the rabbits and to collect pertinent facts to be used in biological control.

Field trials with myxomatosis virus were undertaken on a large scale in 1950. At first, only a few local outbreaks of infection were observed; however, in early December rabbits were reported dying by the hundreds and in early January the epizootic gathered momentum rapidly. When high mortalities (90 percent or better) occurred, they were usually achieved within three or four weeks after the first-noted infection. In one closely studied area, a careful estimate gave a 99.5 percent kill, but approximately 80 percent of the small fraction that survived showed antibodies. Too many immune rabbits, which should be shot, are surviving this epizootic. In some areas where a 99 percent kill was obtained during the first year, only moderate evidence of sick and dead animals was found in the second year.

Great Britain has an estimated population of between 60 and 100 million wild rabbits. Here the annual loss of all cereal grains from rabbits is around 15 million pounds. Continual rabbit grazing also has a depressing effect on the growth and establishment of pastures. In a recent English investigation it was found that an area averaging 20 rabbits to the acre in 18 months will reduce the sheep-carrying capacity of chalk grassland by 27 percent and the live-weight increase of sheep kept on the land by over 60 percent. Other crops seriously damaged by rabbits are sugar beet, kale, turnips, all truck gardens and fruit trees. Since rabbits kill trees by ring barking, damaging leading shoots and preventing natural regeneration, foresters—as well as fruit growers—spend large sums on the erection of rabbit-proof netting and employ hundreds of men as patrols and rabbit catchers.

The problems of rabbit control vary according to the country. In France the damage to crops has to be balanced against the interests of nearly two million hunters, and in the Netherlands a very orderly agriculture will permit only a few wild rabbits to subsist. When first introduced into England in the 12th century the wild rabbit was highly valued for fresh meat and was closely preserved by lords of the manor. It has long since spread all over England, Wales, and Scotland and is a continual drain upon the increasing intensive agriculture. The annual cost in Britain of protecting 750,000 acres of state-owned plantations against rabbits is around 500,000 pounds, while the cost of protecting privately-owned woodlands is estimated to be 1.5 million pounds.

Thompson, writing on the possible dangers of introducing the European rabbit in our country, indicates that the European rabbit has been quite successful in becoming established in different parts of the world and warns of the danger in trying to control this animal.

The European rabbit, averaging a little over three pounds in weight, is a little larger than the cottontail and has longer ears and browner fur. It has a similar breeding season, gestation period and reproductive potential and differs chiefly in its burrowing habit. Some European rabbits live like cottontails (mainly above ground) taking cover in scrub or cutover woodland, but the majority have burrows in woods, banks, hedges or open fields. These burrows, which are sometimes extensive tunnel systems covering perhaps ¼ acre and going to a depth of nine feet, are dug by the rabbits themselves and are not taken over from other mammals.

Roger Latham states that releases of the San Juan rabbit in Pennsylvania are no more than two years old, and information concerning its adaptability to this environment is meager. It is known that some of the animals survived at least one winter, even in the most northern counties. Examination of release sites has shown that they will eat a variety of native plants and agricultural crops, and appear to browse plants not normally eaten by native cottontails. They eat considerably larger quantities of vegetation than the cottontail and, therefore, are individually capable of far more destruction. There is also evidence in Pennsylvania that the released San Juan rabbits are digging their own burrows.

It is impossible to forecast what effects would follow if the European rabbit became established in the United States. We are aware of what happened when two exotic birds, the English sparrow and the starling, were added to our avian fauna. At first, the releases of these two species were not successful, but eventually they succeeded in becoming established. Although comparisons with Australia and other countries may not be entirely valid, the danger of the San Juan rabbit becoming a serious pest is surely a very real one. For this reason the Virginia Commission of Game and Inland Fisheries has a regulation prohibiting the importation and release of the San Juan rabbit in the Old Dominion. Once the sportsmen of the state realize the great damage which may be caused by this rabbit, they will perhaps help in a program to prevent the possible entrance of a potential nuisance.

NATIVE WILD ANIMALS (Continued from page 13)

three black bear cubs now in the custody of the Virginia Commission of Game and Inland Fisheries. Orphaned in Nelson County when their mother was killed soon after their birth, "The Three Bears" have been the subjects of a special study by the Wildlife Research Unit at Virginia Polytechnic Institute and have appeared in a wildlife exhibit in the George Washington National Forest while awaiting the construction of their permanent home at Maymont. Plans call for them to inhabit the area in the vicinity of the old quarry which is located just below the approach to the Boulevard Bridge on the north side of the James River.

Like those for the other animals in the exhibit, the habitat for the bears will be built to appear as natural and as unobstructed as possible. While the animals will be safely confined to their individual areas, visitors to the exhibit will get the impression that the animals are "in the open." This idea will be conveyed by the use of such devices as sunken walls and moats, patterned after those at some of the country's most modern zoological exhibits. Advice on this aspect of the project has been provided by John E. Wallace of St. Louis, a pioneer in the new naturalistic concept for zoos.

All of the habitats are being constructed of materials that will insure their permanancy. Wood, for example, will not be used in the habitats because of its tendency to rot and to absorb odors. Concrete will be the principal material employed and the volunteer consultant engineers are planning to make the concrete appear as much like natural stone as possible. This phase of the planning has been handled by a committee composed of E. Turpin Phillips, Jr., L. S. S. Smith, John Roberts, T. M. Daly, George Cheadle, Louis Washer, Jr., and C. W. Wilkinson.

To join the bears as the various habitats are completed will be the beaver, bobcat, chipmunk, deer, elk, red fox, gray fox, groundhog, mink, muskrat, opossum, otter, rabbit, raccoon, spotted skunk, striped skunk, gray squirrel, southern flying squirrel, Allegheny least weasel and New York weasel. Birds and waterfowl to be displayed in enclosures and ponds are the cardinal, clapper rail, crow, dove, mallard duck, wood duck, ruffed grouse, gull, Cooper's hawk, sparrow hawk, barn owl, screech owl, quail, sandpiper, tern, turkey buzzard and wild turkey. All animals for the exhibit will be provided through the cooperation of the Virginia Commission of Game and Inland Fisheries.

When the construction work has been completed, including the installation of sewer and water facilities, garden clubs and other groups will take charge of the landscaping of the entire exhibit area. Prominently featured will be the native flora of the state, including dogwood—the state flower, redbud, rhododendrons and azaleas as well as the less showy but equally interesting low-growing wildings. This committee, headed by Mrs. Russell R. Innis, with Mrs. A. D. Livesay as co-chairman, will also assist in planning the plantings about the various habitats to make them appear to blend into the surrounding landscape.

At the conclusion of the construction and landscaping program, the committee envisions one of the most appealing, educational and recreational exhibits on wildlife in the entire country. They hope that the naturalist to be employed by the city to manage the exhibit will be able to work with schools and other groups interested in the preservation of the natural resources of the state and thereby extend the influence of the Maymont Park exhibit.

Davenport cautions that it may be some years before the exhibit reaches its final and permanent stages, for progress on the project is dependent entirely upon public contributions. To speed the exhibit along its way, the committee is appealing to individuals, civic organizations, foundations and firms to contribute to the wildlife exhibit. Groups who wish to "adopt" a certain animal and provide the necessary habitat for it will be recognized by a permanent plaque to be erected at the site. Information concerning the exhibit may be secured at the committee's headquarters in the Mosque.

THE VIRGINIA PLAN (Continued from page 7)

more emphasis, it soon became apparent that recreation was likewise to become a major use.

The importance of wildlife as a resource came a little later, and, when it came, it soon developed as a phenomenon of major importance. This was especially true in Virginia. Ted Fearnow, now a forester in the regional office of the U. S. Forest Service in Philadelphia and a man who was in on the Virginia wildlife story from the start, likes to attribute the beginning to two men, a forester and a man named Judd.

How It Began

The two men in question were together one day in the haze-shrouded Blue Ridge Mountains, and they stopped to rest for a while beside a gushing spring.

"Have a drink, Judd," said the forest ranger invitingly. "It's a hard climb to the top of the ridge and we got much to do—much to talk about."

Judd drank slowly and long. His hands shook a trifle as he drained the dipper, for he was in his fifties, then he flipped away the last few drops of water with the spirit of a man much younger. As they stood in the shade of the spring, a nervous grey squirrel bounded over a fallen chestnut log, hardly a dozen yards away, then sprang to a white oak and scratched its way to the top of a crooked limb.

"Interesting fellow, isn't he?" said Judd, warmed by the touch of simple wildlife in the forest. "Now there's a problem for you. What are you doing for him? You foresters look after the timber all right, but what about the game—the squirrels, turkeys? What about the deer

and the bear and the grouse? What are you doing for them?"

The ranger paused a moment, reflecting, then looked Judd square in the eye.

"Well, Judd, I'll tell you. The wildlife belongs to the state. We in the Forest Service have little or no control over it. The federal government, you know, owns the land but you Virginians own the wildlife. It's the state's game. There's the rub, and it's not easy to solve."

Judd thought about this poor state of affairs and shook his gray head.

"It doesn't make sense," he said. "You federal people own the land, the timber, the food and shelter of wildlife and yet can't do anything for the wildlife. You can't do anything for that waif over there, the squirrel, because he belongs to the state. Deplorable! Seems to me we ought to be able to get together and straighten this out."

Such, then, was the modest beginning of the so-called *Virginia Plan*—a plan of collective forest-game development that rolled out a new era for wildlife management, a new era for tri-level governmental action in resource development unlike anything conceived in America.

The Plan in Operation

What about the substance of the plan though? What is its nature? How does it work? Well, the whole thing in a nutshell is simplicity itself. The sportsmen were asked to pay an extra dollar for the privilege of hunting and fishing on the national forests—the George Washington and the Thomas Jefferson — and in doing so would create a special fund which would be earmarked for forest-game development work. The federal and the state administrators would sit down together regularly, discuss needs, policies and like matters and agree on what was to be done. The one cardinal principle to be stressed by Virginia's General Assembly in 1937, when the special enabling act was passed authorizing the Virginia Game Commission and the U. S. Forest Service to enter into a cooperative agreement, was that all plans for cooperative game management "be jointly developed and administered under a pattern of mutual participation and assistance."

Before this sense-making agreement was entered into, Virginia's forest wildlife received little attention outside of the fixing of game seasons and the setting aside of a few refuges.

The New Look

Today the picture is unbelievably different: healthy second-growth forests making a spectacular comeback, watersheds gaining in protective use, streams running clear, cold and uniform and harboring as fine a brook and rainbow trout as can be found anywhere in Virginia. Today the vast stretches of these forests are now public hunting lands of immense acreage, the largest contiguous public shooting ground east of the Mississippi. And what of the people and the communities? Once more they are happy and prosperous. There has been a change of spirit, a kind of rebirth or resurrection in the will of the people; a land metamorphosis. The life-sustaining resources of the Blue Ridge are being restored in a noble effort and the heart of every Blue Ridge Virginian is in it.

Today Virginians feel proud of their achievements west of the Blue Ridge. New roads, schools, homes, communities are breathing new life into the landscape. New industries are moving in. Recreation has become big business. Each spring some 100,000 hopeful Waltonians flock to the state's 135 stocked trout streams for a gala time. Each fall 200,000 hunters converge on the western counties in search of deer, bear, turkey, grouse. Some schools close. Factory workers take their long-awaited vacations. All summer long hundreds of recreation seekers go to the mountains.

Financing

When the *Virginia Plan* went into effect in 1938 the Virginia General Assembly passed enabling legislation requiring a special $1 *national forest stamp* of every person hunting or fishing or trapping on national forest land. This was in addition to the required state license or county license on hunting and fishing and trapping. These "stamp money" proceeds, the law said, could be used for one purpose only: wildlife and fisheries restoration work on the national forests. Administration was placed in the hands of the Virginia Game Commission but the understanding was that the money was to go for special projects *jointly planned* by the agencies concerned.

During the first year of operation the total stamp sales amounted to only $11,000, just enough to get the program started. Since that date the total sales have steadily risen until today (1955-56) sales have grown to $74,000.

In addition to stamp funds, the present cooperative budget is aided by Pittman-Robertson funds from the federal government. For every three dollars put up by the federal government, the state puts up one dollar. In recent years the total game and fish budget has been running around $200,000. In view of the fact that cooperative projects cover some 1½ million acres of land, this averages only about ten cents an acre for improvement work. While this may not seem much on a per-acre basis, the cumulative expenditures over the years amount to a sizable figure.

Management in Action

The cooperative effort on the national forests is performed through a system of game management units. Each unit has assigned to it a full-time game manager who is responsible for the improvement work to be done. At present the units range in size from 10,000 to 80,000 acres with a total of 24 game managers on the job. Fourteen of these are working on the George Washington.

Supervision of game managers is the responsibility of biologists. These workers are paid by and are under the supervision of the State Game Commission. Work planning, however, is cooperative throughout, from top level

in the main offices of the agencies concerned down to the forest supervisor, district rangers, and assistant district rangers. Each forest, too, has one forester—a U. S. Forest Service employee—who devotes a good bit of his time to working with the biologists in formulating work plans and seeing that proper coordination of projects takes place.

Better Land Utilization

Maximum sustained yield in natural resources and management under the multiple-use principle has given the national forest lands a better pattern of land use. Insofar as possible, the lands are managed for their most productive combined use. As a result, large deforested areas have been reforested and are once more draping the mountains with a carpet of green. Old and nonproductive timber stands are being replaced with sturdy young timber. The watersheds are improving in absorbent quality. Silviculture is striving to maintain forest growth in such ecological balance so as to benefit all major uses.

Just how much effect the *Virginia Plan* itself has had on total land use is difficult to ascertain since the program is still too young to judge. One thing is certain: land use west of the Blue Ridge is shifting. Water and recreation are assuming more and more importance.

Summary

The *Virginia Plan,* not 18 years old, is a program of resources development on the 1,500,000 acres of national forest land in Virginia comprising two national forests—the George Washington and the Thomas Jefferson. The program is essentially one of cooperation between the U. S. Forest Service, the owners of the land, water and vegetative cover, and the Virginia Commission of Game and Inland Fisheries, representing the Commonwealth of Virginia in the ownership of wild animals.

Though the remarkably successful program revolves around forests and game and fish, all of the natural resources are involved in the joint effort of resources restoration, sustained yield and multiple use.

Success of the *Virginia Plan* is based upon two main features: a strong sense of cooperation between the resource agencies concerned and the democratic methods of operation. A sound legislative and financial base adds further strength as does a strong sense of conviction by the men who direct and execute the program.

Though not perfect in all its aspects, the *Virginia Plan,* like the American Constitution, is a flexible and democratic entity, continually subject to change and refinement, a plan of operation and development close to the people and for the people. It is another example of practical conservation at work, of better land and resources utilization for the greatest number of people for the longest time. It is another example of democracy in action under the American Way.

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FUTURE OF HUNTING AND FISHING

(Continued from page 17)

restrictive and payments in fee or in services undoubtedly will be more and more common. On public lands the picture is brighter, but there again the supply of hunters will have to be geared to the safe wildlife supply—the annual harvestable surplus only. As more public lands are acquired for wildlife purposes and good management increases production thereon, still more hunting can be provided. However, there is a limit to what can be done even on the public lands, and we should be prepared to accept such a point of limitations. The present deer situation is an example. Some erroneously think we can keep our deer herds increasing indefinitely until we have venison in every ice box. It can't be done.

So what's the solution to the dilemma? Well, one answer—suggested by some—is that we place some limit on our own human fecundity. If we can't do this, then we'd better adjust to two ideas: put a higher price tag on wildlife, which includes higher sporting value, higher recreational value, higher esthetic value. For every form and number we have we'll have to derive more enjoyment from it. Secondly, to have a safe supply of wildlife around, we're going to have to provide for it. This means deliberate and costly attempts at insuring the living requirements of wildlife—giving wild creatures the best home life we can, and letting nature do the rest. This means the best in food, cover and range. It means the best protection from enemies, including wildlife's greatest mortal enemy—man.

Fishing

Prospects for future sport fishing, in both inland and marine waters, are brighter than for hunting. Fish, unlike animals, have greater biotic potential and lend themselves to quick supply more rapidly.

Besides the potential present in huge reservoirs all over the land, fishing can and is being increased by the construction of hundreds of thousands of small ponds on the farms all over the nation. In Virginia, for example, we've had 12,000 farm ponds added to the landscape in the past decade alone—with 38,000 more on the agenda—a fishing potential not to be underestimated. Nation-

wide, some 2,000,000 farm ponds are now affording angling.

Finally there's the potential of the great oceans themselves. Here good management and careful harvesting can produce sport fishes indefinitely, but not without wise conservation measures. Even the saltwater species can be decimated if improper harvesting measures are used and the fish are not given the chance to multiply.

Outlook on Hunting and Fishing

All in all, it is safe to say that hunting and fishing in America, pruned hard as they may be by rising population pressures, are destined to remain with us for some time to come. Gamewise, the average nimrod need not sell his gun and take up golf. He may have to be satisfied with less game and go in more for such activities as bow and arrow hunting, photography, nature appreciation, but he can still enjoy the pursuit or the companionship of wild creatures.

As with fishing, here again it must remain on how much we are willing to pay for our sport. Thus far, evidence bears out that the fisherman is willing to safeguard his favorite pastime by adding revenue to the till that supports angling programs. The picture is brighter and due to become still brighter as more acres of waters are created and new and better ways found to harvest fish.

It's by no means a gloomy picture. We can have what we want pretty much in outdoor recreation, but what we *will have* and *what we would like to have* are different matters. Are we willing to pay the price for that difference?

HARMLESS SNAKES (Continued from page 9)

(figures 7, 8, 9, 10, 23 and 24). If bitten by one of these reptiles, while fishing or wading, care should be given the wound and an antiseptic solution used to prevent infection.

The red-bellied water snake is sometimes referred to as the "copperbelly." There is no mistaking his reddish underside (figure 10). Young examples of the queen—or leather—snake (figure 23) and the striped water snake (figure 26), a near cousin, may be separated as noted in the illustrations. It has been said that the other striped snakes (figures 21, 22, and 28) are related to the water snakes. Some pattern similarity may be noted by comparing the actual specimens or good illustrations. The swamp-side ribbon snake (figure 22) is a neat, well-groomed-looking animal. His trick is a "now you see me, now you don't" act. Focusing the eyes on his stripes a human, and perhaps his animal enemies, will soon lose him.

Among the most beautiful of Virginia's reptiles is the corn snake (figure 16). His black-bordered, crimson blotches on a tan background splashed with orange and milk white make him an object of great beauty.

Interest in the science of herpetology is spreading, here as elsewhere, and it is hoped that we may soon have a state society through which all of the scattered information may be routed for compilation. Professionals may find this an excellent medium for dissemination of information to a growing number of amateur enthusiasts.

County-by-county records of snakes of Virginia are by no means as complete or as accurate as they should be. The information is widely scattered. Some counties have never had a survey and only a hazy, educated guess may be advanced as to the varieties to be found in some of the ninety-eight counties of the state. A popular key or guide to the Virginia snakes should be undertaken and distributed to outdoor clubs and camps. This would have to be somewhat more detailed than the present superficial undertaking, and in natural color, if possible. Such a key, once available, could be placed in the hands of explorer scouts, hikers, canoeists, 4-H members and interested high school and college biology students who might be inclined to aid in the county-by-county census. The writer hopes this article will serve to arouse some enthusiasm for this project.

FIGURES

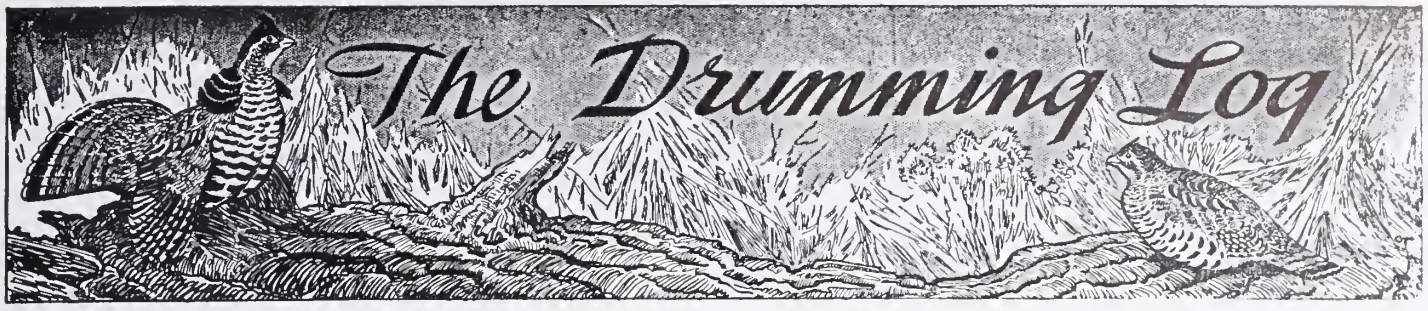
1. Smooth scales
2. Keeled scales
3. Canebrake rattler
4. Timber rattler
5. Water moccasin
6. Copperhead
7. Brown water snake
8. Common water snake
9. Banded water snake
10. Red-bellied water snake
11. Young black racer
12. Mud snake
13. Common king snake
14. Mole snake
15. Milk snake
16. Corn snake
17. Pine snake
18. Young pilot black
19. Spotted chicken snake
20. Hog-nosed snake
21. Common garter snake
22. Eastern ribbon snake
23. Queen snake
24. Striped water snake
25. Rainbow snake
26. Striped chicken snake
27. Ring-necked snake
28. DeKay's brown snake
    Red-bellied snake
29. Red milk snake
30. Coral snake (not native to Virginia)
31. Scarlet king snake
32. Scarlet snake

1 and 2 represent several species of over-all uniform coloration.

NEW TROUT SEASON (Continued from page 11)

months old. By planting these yearling trout, smaller streams can be more efficiently stocked and in-season stocking in streams subject to chronic mid-summer, low-water conditions can be utilized to a greater extent. A larger number of fish can be reared and stocked if greater reliance is placed upon yearling fish as opposed to two-year olds. This should provide the fish division with an increased latitude in selecting streams for stocking and assist with plans to "spread out" trout fishing over a longer period of time.

In summarizing the major changes anticipated for the 1957 trout season, we can expect to see you a little earlier (April 13 rather than May 1); have you stay a little longer (December 31 as compared to September 15); and hope you find satisfaction with our efforts to "spread out" the trout season by in-season stocking and placing greater reliance on the stocking of yearling trout.



Dates Set For I. W. L. A. 1957 National Convention

The 1957 national convention of the Izaak Walton League of America will be held in the Mayflower Hotel in Washington, D. C., beginning on April 2. According to Floyd S. Sumner, president of the Virginia division of the League, a Virginia room will be a feature of the convention. Items of special interest to people of the Old Dominion will be displayed in this room.

U. S. Forest Service Promotes Hanlon

According to forest supervisor A. H. Anderson, George Washington National Forest, staff assistant Peter J. Hanlon is being promoted and transferred to the regional office in Upper Darby, Pennsylvania.

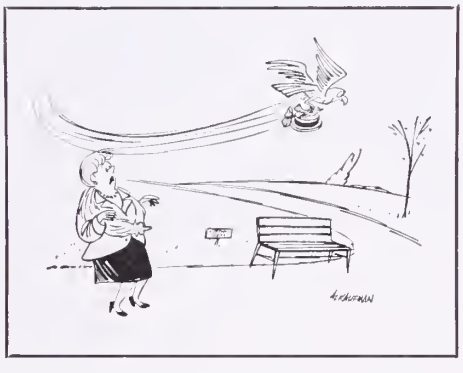
Mr. Hanlon, a graduate of the Syracuse University School of Forestry, came to the George Washington National Forest in 1948. Prior to that time he was assigned to the Monongahela National Forest in West Virginia. Hanlon's work on the G. W. has been in connection with timber sales and wildlife management.

The Hanlons plan to continue living in Virginia until this summer. Many sportsmen throughout the state will miss Pete, who is widely known, and the wonderful work he has been doing in order to assure them more wildlife for their annual hunting forays on the G.W.

Interesting Goose Killed

According to the Honorable William Moscoe Huntley, judge of Hustings Court of the city of Richmond, a goose killed by his party in Henrico County in early December of last year bore an interesting identification tag. The tag, which read "Jack Miner, Kingsville, Ont., Canada, 'Be Not Afraid, Only Believe,' Mark 5:36, AS 44," was sent to the Jack Miner Refuge in Canada for identification. It seems that this was the last goose banded by the late Jack Miner, who died in the fall of 1944. The tag indicates A—the first catch, S—spring, of 1944.

There is no record of the age of this goose at the time of banding, but it lived for twelve and one-half years after its release. This is certainly an interesting band return and should encourage others killing banded or tagged animals to follow Judge Huntley's example.



New Mouse Control Technique

According to Dr. Frank S. Horsfall, associate horticulturist at V. P. I., a ground spray of endrin is the latest and best method of controlling orchard damage by mice.

Experiments indicate that for the first time there is a way to destroy the total mouse population on a large tract of land. At the experimental rate of two pounds per acre, endrin does a wonderful job in destroying all pine and meadow mice.

Ground-sprayed endrin, properly used, seems to be of little danger to wildlife other than mice. Full directions on the use of this spray may be obtained from county agents or from the Dept. of Horticulture, V. P. I.

Fish Stocking to Increase on G. W.

A recent meeting between representatives of the U. S. Forest Service, the Commission of Game and Inland Fisheries and the U. S. Fish and Wildlife Service indicates that trout stocking on the George Washington National Forest this year will be double that of last year.

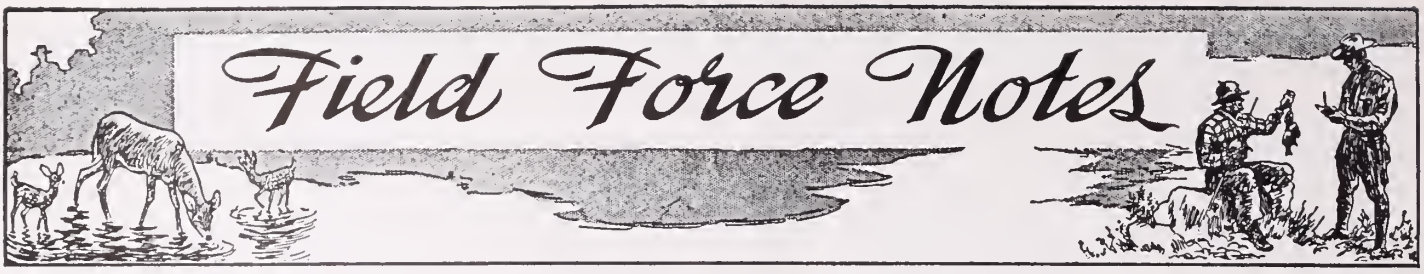
Mr. A. H. Anderson, forest supervisor, explained this as a part of the new plans which are to double the forest's recreation facilities during the next five years.

Stocking will not begin before the season opens, as in the past, but will be done at monthly intervals from March through June and, to a lesser degree, in July. These stockings will place approximately 79,000 fish in the streams of the G.W.

"Unless disaster strikes, the fishermen who come to the forest this year should leave in a happy mood," Mr. Anderson stated with regard to the coming season.

I. W. L. A. Sports Show

Norfolk chapter 13 of the Izaak Walton League of America held its fourth annual sports show in the Norfolk Municipal Auditorium - Arena February 15-17. The attendance for this show has been rising each year and 1957 was no exception. Over 50,000 people thronged to the arena to view one of the greatest displays of sporting goods ever assembled under one roof. Included in this vast show were 53 booths showing the equipment and incidentals pertaining to all aspects of the sportsman's life. The chapter is now looking forward to even greater shows in the future.



Pioneer Game Manager Retires

Clarence E. (Cam) Huffer, game manager for the Commission on the North River management area during the last 29 years, recalls many exciting experiences in connection with his work. Mr. Huffer's retirement became effective December 31, 1956.

During the late 20's and through the 30's bridges were unheard of on the North River area. Travel in the model-T was very precarious during this period because of having to ford the streams. High water presented an obstacle in the spring and treacherous ice proved unstable during the winter months. These inconveniences are only part of the adverse conditions under which "Cam" worked during the early days of game management.

Mr. Huffer, Virginia's oldest game manager in years of service, was instrumental in re-establishing deer on the North River area. Much of his time in recent years has been devoted to planting hybrid chestnuts and clearing areas for food plots.

"Cam" is well known to the people of the North River area, and his devoted work in game management is much appreciated. His long and devoted service is an excellent example of a man dedicated to conservation.

Ducks Enjoy Company

Deputy game warden Walter Lamie, of Smyth County, relates an interesting incident which occurred in the Saltville area last fall.

During the fall of 1955, twelve banded mallard ducks were released on the golf course pond in Saltville. The ducks wintered on the pond and then made their regular migration flight northward in the spring of 1956. In the fall the same mallards returned, accompanied by 113 additional ducks and two Canada geese. It appears that the original thirteen mallards were very congenial and well liked by their wild friends.

National Museum Identifies Shrew

Last summer an interesting pigmy shrew was found dead in the swimming pool of the Virginia Federation of Garden Clubs' Nature Camp at Vesuvius. Sent to the National Museum in Washington, D. C., for positive identification, the shrew has been identified as *Microsorex hoyi winnemana* by Miss Viola Schantz and Dr. Hartley H. T. Jackson, who are authorities on shrews.

The pigmy shrew is one of our rare animals. This individual was found in a swimming pool in Rockbridge County last summer.

This tiny animal is so rare that it is seldom seen even by those who trap for small mammals, and the National Museum has only a few specimens in its collection. The shrew mentioned above is in the possession of Max Carpenter, the Commission's special services officer for the northern district, and he prizes it quite highly.

Biologist Leaves Commission

George A. Gehrken, game biologist with the Commission for the past eight years, resigned effective February 1, 1957, to assume a newly created position of wildlife consultant with Union Bag-Camp Mamfacturing Company in Franklin, Virginia.

Gehrken's activities with the Game Commission centered around the farm-game program being carried out in the southeastern part of the state.

The new job, in the woodlands department of Union Bag-Camp, represents a greater effort by industrial concerns to practice conservation and game management on company-owned lands. This organization is one of the first in the country to hire a full-time biologist in this capacity.

Northeastern District Gets New Biologist

H. L. Sheldon, a native of Clearwater, Minnesota, has joined the Game Commission staff as a district game biologist. Howard received his B.S. degree from St. Cloud State Teachers College in Minnesota and his M.S. in wildlife management from Pennsylvania State University.

His district will be the northeastern portion of the state. Definite headquarters have not been established.

From 1951 to 1955 he served with the United States Navy. Howard is married and has one son.

Education Staff Member Accepts Position With WRNL

Robert J. Spiker, who has been in the publicity and publications section of the education division since August 1956, has resigned from the Commission to take a position with the continuity department of Richmond radio station WRNL.

In his new position, Spiker will write broadcast copy for the station's advertising clients, or as it is more commonly referred to, "commercials."

Spiker did his undergraduate work at Randolph-Macon College in Ashland and received his degree at the Richmond Professional Institute here. Upon graduating, he taught social sciences in Virginia public schools for one year prior to coming with the Commission last summer.

Wildlife Questions and Answers

Ques.: **Is the common ant as powerful as many people say it is? I have heard that it is the strongest of insects.**

Ans.: The common ant is exceptionally strong for its size. Insects much larger are often moved by the tiny ants found around our homes. It is believed that some of our beetles are the strongest for their size of any creature in the insect world. Some of these specimens have carried weights 850 times greater than their own. In comparison, a human who was as strong could lift 70 tons.

Ques.: **What is the name of the fish found several years ago that was believed to be extinct? At the time, it was considered a great discovery by scientists throughout the world.**

Ans.: The fish to which you refer is probably the coelacanth. The first living specimen of this fish, which was thought to be extinct for 70 million years, was found in 1938 near East London, South Africa. Since that time, two others have been collected near Madagascar off the Comoro Islands.

Ques.: **Is the flossy material found in milkweed pods ever used in any way?**

Ans.: Yes. In the second World War the government asked people to collect these pods for use in making life jackets for aviators. Many people collected hundreds of pounds of pods and contributed a great deal to the war effort in this manner.

Ques.: **Has anyone ever worked on the problem of evaporation from our water supply reservoirs? It seems that during a drought year thousands of gallons of water could be lost through the process of evaporation.**

Ans.: Yes. It seems that our friends "down under" in Australia have investigated this field of water conservation. Under laboratory conditions, the use of cetyl alcohol on the surface of water has cut evaporation by 80%. It is important, of course, to use a substance that is not harmful to animal life. Apparently, cetyl alcohol, which is obtained from whale oil, creates a film over the water surface. This film restricts the water and partially prohibits its escape into the air. However, the alcohol does not prevent oxygen in the air from entering the water.

Australia reports a water saving of from 20% to 70% in dams and reservoirs after a two-year trial period.

Ques.: **In a recent article I read, the author mentioned that a great deal of enjoyment could be derived by observing the life in a "stratified forest." What did he mean by this term?**

Ans.: The author was probably referring to the various animals and plants found at different heights within the forest. There is a large variety of plant and animal life in the soil itself. Beneath the leaves on the ground surface is found a different group of plants and animals. Higher yet, on the trunks of trees, are still other forms of life. These species change with elevation since each has a preferred type of habitat. Many birds, for instance, nest low in trees while others nest near the top. This large variety of plant and animal life offers many hours of pleasure to the person who takes the time to observe it.

"Look at that lucky stiff, and we haven't had a decent bite all day."

Ques.: **How are rocks formed?**

Ans.: Rocks fall into one of three general groups, depending upon their origin. These three general groups are: igneous, sedimentary and metamorphic.

Igneous rocks are those that are formed as a result of the cooling of lava from a volcano. Sedimentary rocks are formed by a process of material settling out of moving water. This material builds up, layer on layer, until the lower particles are under terrific pressure and are pressed together into solid rock. Metamorphic rock is a combination of sedimentary and igneous rock bonded together by heat and pressure.

Ques.: **Is the "serviceberry" that mountain people speak of the same as the servieeberry?**

Ans.: This is another example of colloquial names for a common species. This species is also known as Juneberry and shadbush. Botanically, it is known as *Amelanchier canadensis.*

Ques.: **What type of plant is the growth found on many of our rocks?**

Ans.: This growth to which you refer is a lichen. Lichens are interesting because they are actually two plants rather than a single plant. It is a combination of algae and fungi growing together to the advantage of each other. Algae can manufacture their own food while fungi cannot. The fungi live on the food made by the algae and, in return, catch and hold water which is utilized by the algae in making this food.

Ques.: **The buck deer I killed during the last hunting season had a beautiful rack of antlers. However, there were a few small holes scattered over the rack. Could you explain what causes these imperfections?**

Ans.: The small holes in the antlers of your trophy are probably the result of the larvae of the botfly. In the early stages of development, antlers are soft and spongy. During this period they are very susceptible to damage. The botfly often lays eggs in the soft tissue and the resulting larvae hatch, leaving small holes.

Ques.: **I have several birdhouses around my home. Last year some of these were not occupied during the nesting season. A neighbor suggested that these houses should be cleaned each year. Should they?**

Ans.: Yes, you should clean the boxes after each nesting season. Birds, like some people, are rather particular about their living quarters. Many will not use an old nest or build a new nest over an old one. Birdhouses should always be constructed so that they can be easily opened for cleaning.

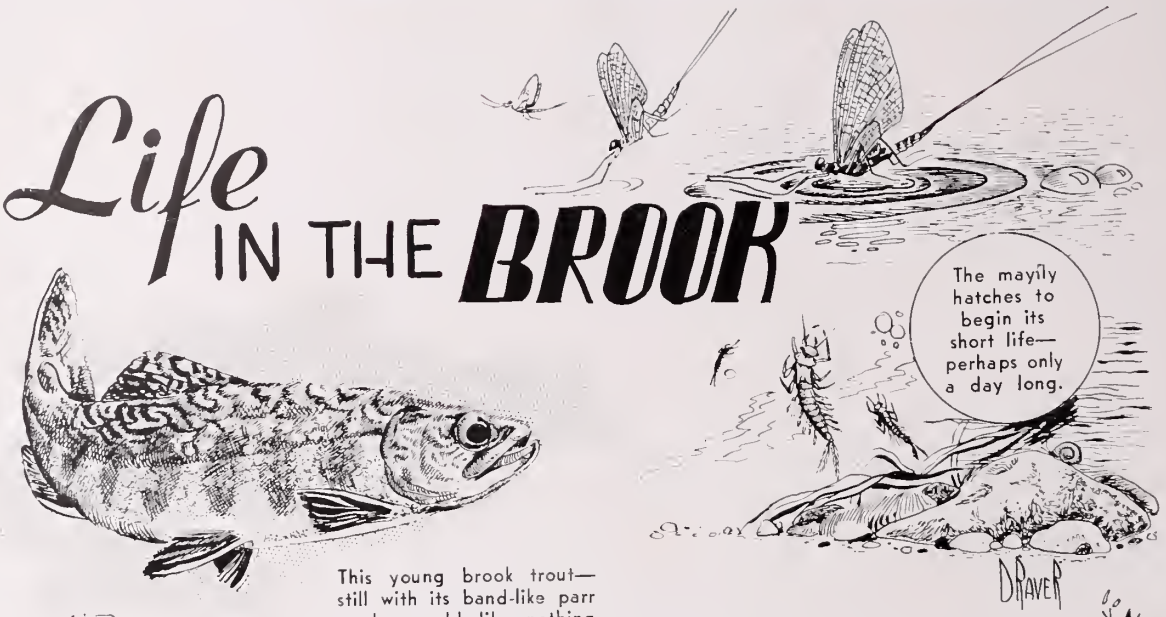
Ques.: **What happens to a bird when it "molts"?**

Ans.: Molting in birds is nothing more than a change of plumage (feathers). Birds molt twice a year—during the late winter and in the late summer. During these periods the birds are quiet and very difficult to see. They spend most of their time in a small area feeding and keeping concealed from their enemies since they cannot fly too well during this plumage change.

Ques.: **Is the bite of a praying mantis painful to man?**

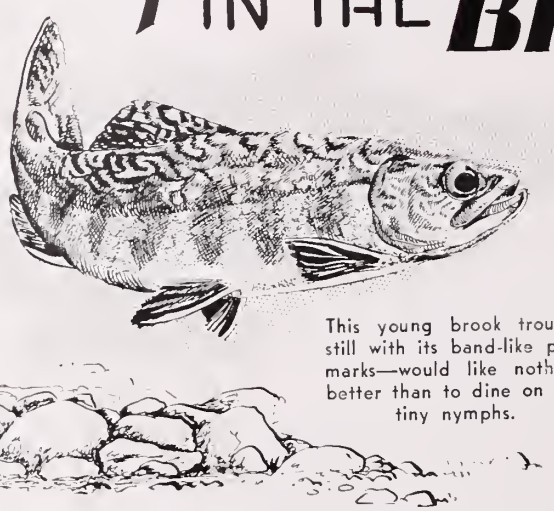
Ans.: Man is seldom bitten by this insect. If a bite should occur, it is not dangerous and little pain is involved. Actually, many people keep these insects as pets in their home. They are either kept in a screened box or left to roam at will. Food and water must be supplied in order for the mantis to survive.

Life IN THE BROOK



The mayfly hatches to begin its short life—perhaps only a day long.

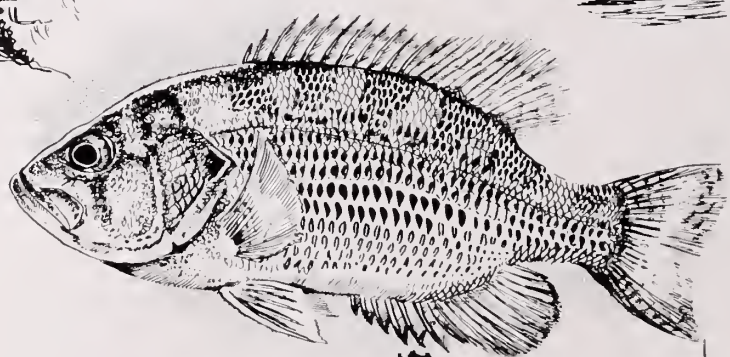
DRAVER



This young brook trout—still with its band-like parr marks—would like nothing better than to dine on the tiny nymphs.

Very often mistaken for the cottonmouth, this harmless banded water snake eats slow-moving fish.

Feeling secure in its shell of sand grains, the caddis fly nymph may still end up on the menu of a hungry fish.



Ever present, the dragonfly is a beneficial mosquito-eater.

The six spines in its anal fin identify the redeye or rockbass, found in the warmer sections of the brook.

A simple box with a glass bottom will open the brook to your view.